

WHAT IS CLAIMED IS:

1. An optical pick-up apparatus which optically records information into an optical recording medium and/or reproduces information from an optical recording medium, comprising:

a light source for irradiating light;

a collimator lens for changing the light irradiated from the light source to a substantially parallel light;

a diffraction grating for diffracting the light irradiated from the light source at least to zero-order diffraction light, plus (+) first-order diffraction light and minus (-) first-order diffraction light, and for providing a phase difference to part of the + and - ( $\pm$ ) first order diffraction light;

light converging means for converging the zero-order diffraction light and the  $\pm$  first order diffraction light onto the optical recording medium;

light separating means, disposed between the light source and the light converging means, for transmitting and reflecting the zero-order diffraction light and the  $\pm$  first order diffraction light; and

light detecting means including a plurality of light receiving elements, for receiving the zero-order diffraction light and the  $\pm$  first order diffraction light reflected by the optical recording medium,

wherein in the diffraction grating, a diffraction area which provides a phase difference to the  $\pm$  first order diffraction light and a diffraction area which provides no phase difference to the  $\pm$  first order diffraction light are alternately disposed adjacent to each other in an extension direction of a grating groove,

and wherein the diffraction grating is formed so that a width  $W_1$  which is a length of a diffraction area which provides a phase difference in the extension direction of the grating groove and a width  $W_2$  which is a length of a diffraction area which provides no phase difference in the extension direction of the grating groove, meet the following formula ( $W_1 = W_2 = D/m$ ),

where  $D$  denotes an effective diameter of a light beam irradiated from the light source and irradiates to the diffraction grating, and  $m$  denotes a number of divisions into which the effective diameter  $D$  of the light beam is equally divided in a grating groove direction ( $m$  is an integer of 3 or more).

2. The optical pick-up apparatus of claim 1, wherein a plurality of the diffraction gratings are adjacent to each other in a direction perpendicular to the extension direction of the grating groove, and the diffraction gratings adjacent to each other are arranged so as to

shift by the width  $W_1$  ( $= W_2$ ) in the extension direction of the grating groove,

and wherein, when a number of divisions into which the effective diameter  $D$  of the light beam is equally divided in the direction perpendicular to the grating groove direction is  $n$  ( $n$  is an integer of 2 or more), a height  $H$  which is a length in the direction perpendicular to the extension direction of the grating groove of the diffraction grating, meets the following formula ( $H = D/n$ ).

3. The optical pick-up apparatus of claim 1, wherein the diffraction grating is disposed between the light source and the collimator lens.

4. The optical pick-up apparatus of claim 2, wherein the diffraction grating is disposed between the light source and the collimator lens.

5. The optical pick-up apparatus of claim 1, further comprising grating moving means for moving the diffraction grating in a direction parallel to an axis of light irradiated from the light source.

6. The optical pick-up apparatus of claim 2, further comprising grating moving means for moving the diffraction

grating in a direction parallel to an axis of light irradiated from the light source.

7. The optical pick-up apparatus of claim 3, further comprising grating moving means for moving the diffraction grating in a direction parallel to an axis of light irradiated from the light source.

8. The optical pick-up apparatus of claim 1, wherein the diffraction grating is attached adjacent to a side of the light separating means which side is closer to the light source.

9. The optical pick-up apparatus of claim 2, wherein the diffraction grating is attached adjacent to a side of the light separating means which side is closer to the light source.

10. The optical pick-up apparatus of claim 1, wherein the diffraction grating is formed on a side of the light separating means which side is closer to the light source, and the diffraction grating is integrated with the light separating means as a single part.

11. The optical pick-up apparatus of claim 2, wherein

the diffraction grating is formed on a side of the light separating means which side is closer to the light source, and the diffraction grating is integrated with the light separating means as a single part.